



**Lightweight plastic fibers
can have added strength
but enough 'give' to enhance
pedestrian safety**

**plastics
&
autos**

Lightweight plastic fibers can have added strength but enough ‘give’ to enhance pedestrian safety

- With pedestrian safety measures growing increasingly strict, pedestrian safety components are currently being developed for vehicle application.¹
- Self-reinforced plastic (polypropylene) is a new engineering process that has been created for use in vehicle hoods to help protect pedestrians in the event of an accident. Though small in size, lightweight and energy absorbent self-reinforced plastic panels are placed strategically where a pedestrian’s head might strike the hood of a moving vehicle to help cushion the head and prevent serious injury.^{2,3}
- Self-reinforced plastic is created by heating and weaving plastic to stretch and align the molecular chains, making the end product is much stronger than conventional plastic, but without any weight gain.^{4,5}
- Engineers performed static deflection tests on a self-reinforced plastic prototype, which withstood the required force load, yet produced greater deflection.⁶ This improved deflection indicates that the panel can provide strength on impact, but enough “give” to offer additional protection to pedestrians.
- Automaker Lotus has already used a front access panel made from self-reinforced plastic for its Elise sports car. The Lotus front access panel was found to be 57% lighter than the current production part and passed mechanical and paint durability tests.⁷
- A manufactured brand of self-reinforced plastic is also currently being considered for components such as under-body shields as a replacement for heavier metal shields, as well as potential applications in cosmetic panels and occupant protection.⁷
- To be strong enough for automobile use, conventional composites can be reinforced with glass fiber, carbon fiber or natural materials, which can make recycling more problematic. Self-reinforced plastic, however, uses plastic resin to create a fiber-like entity and as a binding material. This process allows the plastic to actually reinforce itself, which in turn creates a potentially more recyclable material without sacrificing strength.^{8,7} Recycling is not always available. Check to see if recycling is available in your area.



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The Lotus Elise incorporates SrPP panels on its exterior to increase passenger and pedestrian safety in addition to a number of its interior features.

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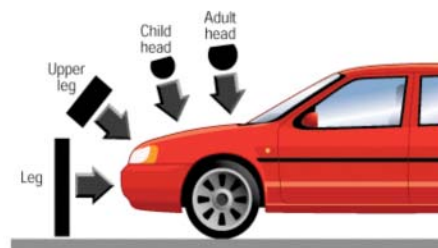
Polypropylene threads are gathered to create the polypropylene fabric that will be hot compacted into SrPP panels.

The lightweight Porsche Carrera GT, with its racecar looks and performance, was initially intended to compete in the 24 Hours of LeMans car race.¹³

Additional Information

- Much of the SrPP information comes from UK research program RECYCLE, under the SMMT (Society of Motor Manufacturers and Traders) Foresight Vehicle Initiative, and is available at: <http://www.foresightvehicle.org.uk/>. RECYCLE was made up of seven UK companies and universities including NetComposites, Lotus Engineering, BI Composites, Propex Fabrics, the University of Warwick, Trauma-Lite, and London Taxis International. The group developed a successful new process for producing SrPP.⁸
- “SrPP products have high impact strengths, making them excellent for areas of [the car relating to] pedestrian safety and passenger protection.”⁵
- As a polypropylene plastic, SrPP is corrosion-resistant. It also satisfies standard automotive manufacturing tests for resistance to hydraulic fluids and fuels.⁵
- SrPP is created through a process called “hot compaction,” in which polypropylene fabric is selectively melted with heat, which forms a composite consisting of the original, highly oriented material held in place by a melted phase.⁹

Diagram of a Pedestrian Impact



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European New Car Assessment Programme. www.euroncap.com

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Pictures

Lotus Elise: ©Lotus

Polypropylene Threads: <http://www.curvonline.com/about/commitment.html#>

SrPP Panels: http://www.netcomposites.com/about_us_details.asp?pid=1007&id=1039

SrPP Panels on Lotus Elise: ©Lotus Pedestrian Impact: European New Car Assessment Programme. www.euroncap.com

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